Expression, variables and types

Lecture 01

Reading: Chapter 2

Values and types: Mathematics

- A value is a basic “thing” a program works with.
  - Examples: 1, 1.2, “Hello, world!”, etc.

- We have encountered values and types in math which can be a good analogy for programs

Values and types: Mathematics

“Value” in math	Type
1.4234	Rational
$\sqrt{2}, e, \phi, \pi$	Irrational
$14i$	Imaginary
$1 - 3i$	Complex

Values and types: Python

Value	Type
15	int
“Julio Pineda”	string
14.1231	float
False	boolean

Values and types

- The ones listed before is not all the different types although the ones listed are the most common ones

- It will be important later in this lecture to distinguish different types from each other:
  - You can’t do the same operations with different types.
  - Or performing operations with different will affect the results
  - Examples later!!

Variables

- The concept is the same as how variables are taught in math:
  - We use another name to represent a value in math i.e. x = 5
  - A piece of the computer's memory is given a name, type and value

message = "Hello class!"

count = 15

me = 2.718281828459

- Demonstration how to determine the type of an expression or variable

Reserved keywords

- Can’t use these as variables!

```
and       del       from      not       while
as        elif      global    or        with
assert    else      if        pass      yield
break     except    import    print
class     exec      in        raise
continue  finally   is        return
def       for       lambda    try
```

Expressions and operators

- 24 – 15
- 112 + 345 * 14
- 32 + (2**8 – 4) / 6

- **How would you do square root? (demo)**
- **Operations with strings? (demo)**
- **Allows follow PEMDAS. If you are not sure about precedence, use parentheses!**

The mod operator: %

- Very important operator especially when we get into if/else control flow

- When you perform a division, you get the remainder.
  - 10 % 5 ?
  - 4 % 2 ?

Logical operators

- Truth table: p and q are Booleans (can be True or False)

p	q	not p	p and q	p or q
True	True	False	True	True
True	False	False	False	True
False	True	True	False	True
False	False	True	False	False

- **How does not, and, or work?**
- >, <, >=, <=, ==. Comparing two values/variables. **Demo**

In-class exercise

- Attempt to answer everything individually
- If you are stuck, ask others and work through the problems
- After everyone is done, we will come together and answer the questions.
- Remember! Precendence/PEMDAS.